

CWPPRA Weevil Rearing Ponds and Field Monitoring Quarterly Report

October 1st to December 31st, 2020
CONTRACT NO. LA-0284

Summary

During this quarter, we conducted maintenance activities at the CADE Farm including data collection on water quality and Salvinia growth. We also monitored field sites in Cane Bayou and Delcambre. We reached out to our stakeholders in regard to the spring weevil harvest. We have continued to use social media to reach out to the public about our program. We hired an undergraduate student worker, Hannah Laville, to help with the maintenance and weevil rearing.

Maintenance of Rearing Ponds and Weevil Harvest

University of Louisiana at Lafayette in CADE Farms: Ponds 3 and 4

Due to the infestation of Cuban bulrush (*Oxycaryum cubense*) in 2019 and 2020, the rearing process was moved to ponds 3 and 4 from 1 and 2 (Figure 1). Ponds 3 and 4 were maintained through a variety of activities during this quarter including fire ant control, spraying BT, fertilizing ponds, and pulling weeds (Figure 2, Figure 3). *O. cubense* and alligator weed (*Alternanthera philoxeroides*) were identified in the ponds, so we hand pulled the weeds (Figure 4). The ponds were fertilized in October and November. In December, the ponds were not fertilized to prevent an algal bloom due to presence of algae. The algae will be reassessed the first week of January 2021. Throughout the quarter, we assessed giant salvinia percent cover, water quality, and weevil density. Other planned maintenance includes levee repair, spraying BT, and continuously monitoring weevil density as the ponds become reestablished.

The overall weevil density in ponds 3 and 4 are low compared to the samea density. BT is being sprayed every 2 weeks to keep the population down. The average adult weevil density in November was 6.05 individuals per kilogram and December was 2.37 individuals per kilogram. The average larvae density in November was 2.68 individuals per kilogram and December is 1.73 individuals per kilogram. The average samea density in November 13.21 individuals per kilogram and December is 22.38 individuals per kilogram.

The reason for the increase of samea and decrease of weevils can be explained. On November 6, 2020, the half of the samples were processed while the other half of the samples were processed 72 hours later. There were only 10 Berlese funnels available on Louisiana State University's campus and 20 samples. The large funnel room located in St. Gabriel, Louisiana was closed before returning from the field. Thus, there is a possibility that the insects died before processing was conducted. We have created another larger Berlese funnel at the Louisiana State University's campus to prevent this situation from reoccurring.

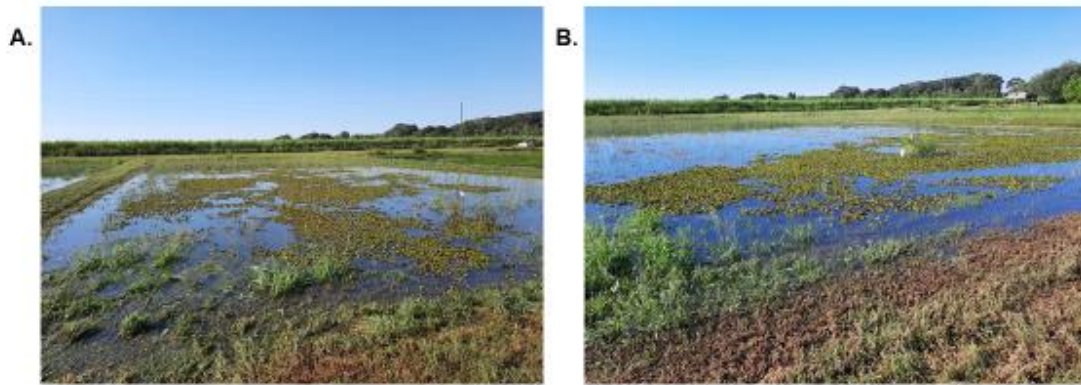


Figure 1. Image taken on October 1st after inoculation from canal source (30.0924, -91.865)
A. Pond 3 **B.** Pond 4

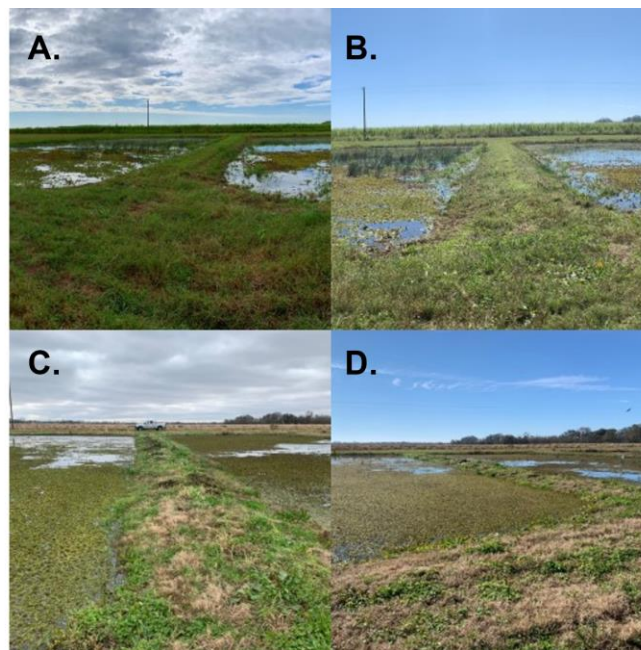


Figure 2. Images of Ponds 3 and 4 at CADE Farms illustrating percent coverage of salvinia over time. **A.** Image taken on October 19, 2020. **B.** Image taken on October 26, 2020. **C.** Image taken on November 2, 2020. **D.** Image taken on December 16, 2020.



Figure 3. Image of Hannah Laville during maintenance of the ponds and sampling to estimate overall weevil density.

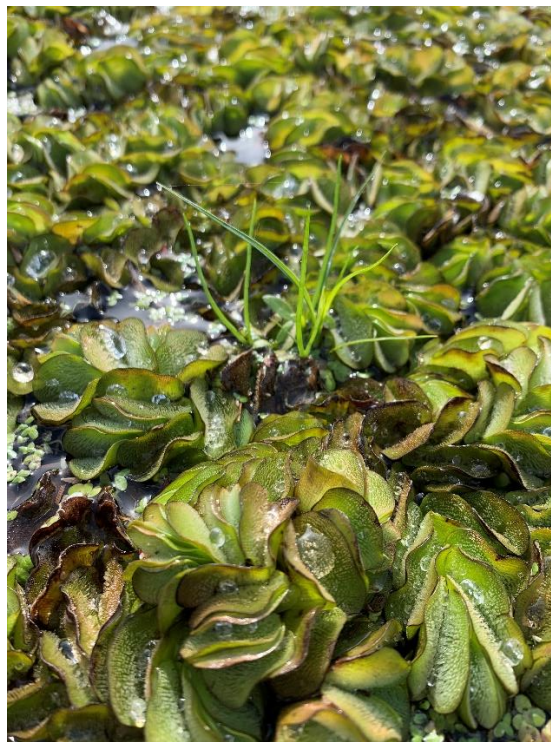


Figure 4. Image of Cuban bullrush (*Oxycaryum cubense*) at the CADE Pond 3 on December 4th, 2020.

Weevil Harvest

The weevil harvest was not conducted during this quarter.

Field Monitoring Sites

Delcambre

During this quarter, Delcambre was sampled on December 1, 2020. *S. molesta* was in the “colonizing” growth form or in the primary growth stage at the control site (Figure 5). *S. molesta* was not present at the release site (Figure 6).

As previously mentioned, the salvinia present is in the primary growth stage, and there was less than two percent total coverage. The salvinia was in small pockets between packed cattails and pushed up on the vegetation (Figure 5). Five samples were collected at the control site. The overall mean adult weevil density was 72.7 individuals per kilogram of *S. molesta*. Weevil larvae and samea were not present in the samples. Due to the minimal presence of salvinia, continued monitoring may not be necessary. However, warm weather in the future may impact salvinia growth in years to come which may require a need for weevils.

The site has highly dense vegetation, so it is difficult to reach the open pond. Once reached, water quality parameters were recorded. Notably, the salinity recorded on the banks was 1.25 ppt while the salinity in the open pond was 2.66 ppt. The landowner observed high waters due to Hurricane Laura and Hurricane Delta. Therefore, we hypothesize that the salinity led to the salvinia die-off during the summer (Figure 5).

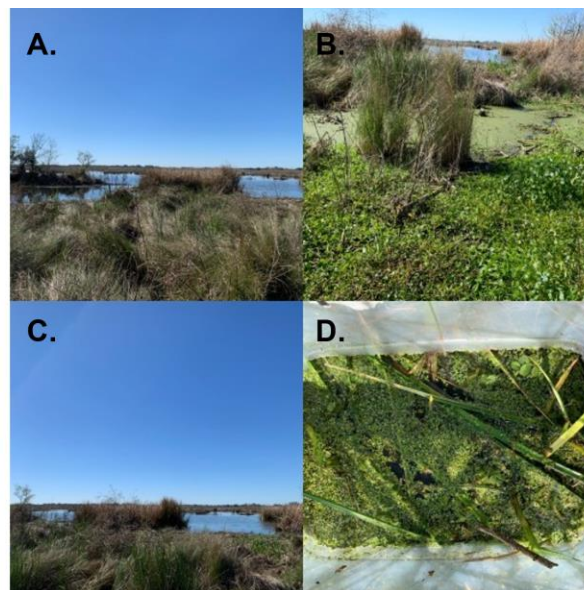


Figure 5. Images taken of the control site on December 1, 2020 in Delcambre, Louisiana. **A.** Highly dense vegetation along the banks of the ponds. **B.** *Salvinia molesta* packed between the cattails in marsh-like conditions. **C.** Clear open water without *S. molesta* present. **D.** Primary growth stage of salvinia from sample 1.



Figure 6. Images taken of the release site on December 1, 2020 in Delcambre, Louisiana.



Figure 7. Images taken of the release site from February 2019 to December 2020 illustrating how weevils have helped reduce the infestation of *Salvinia molesta*. Note that the December 2020 salvinia cover might be the effect of high salinity.

Cane Bayou

Cane Bayou was sampled on November 2020. The sites were accessed by airboat with United States Wildlife and Fisheries. To estimate weevil density, five samples were collected at each of the four sites. The overall mean adult weevil density was 376.35 individuals per kilogram of *Salvinia molesta*. The overall mean larvae weevil density was 4.32 individuals per kilogram of *S. molesta*. The overall mean samea density was 7.15 individuals per kilogram of *S. molesta*. The adult weevil density has increased over time (Figure 8, Figure 9). Mean giant salvinia percent cover decreased 23% since December 2019 (Percent coverage 49.17%; Range >1%-80%) (Figure 10). Similarly, since December 2019, the mean mat depth decreased from 7 cm to 2 cm (Range >0.5-3 cm) (Figure 11). Due to the increase of adult weevil individuals and decrease in salvinia percent coverage and mat thickness, we hypothesize that the weevils are successful at reducing the infestation of salvinia in Cane Bayou, Louisiana.

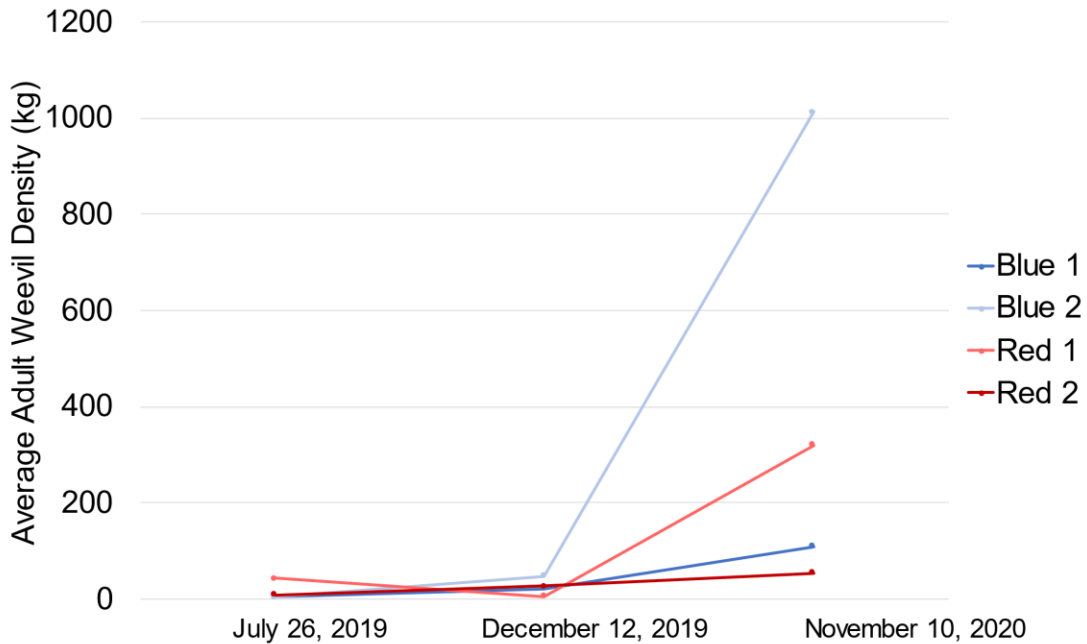


Figure 8. Line graph of average adult weevil density (individuals per kilogram of salvinia) from each sampling time point from July 2019 to November 2020 at Cane Bayou, Louisiana. Each line represents a different release site.

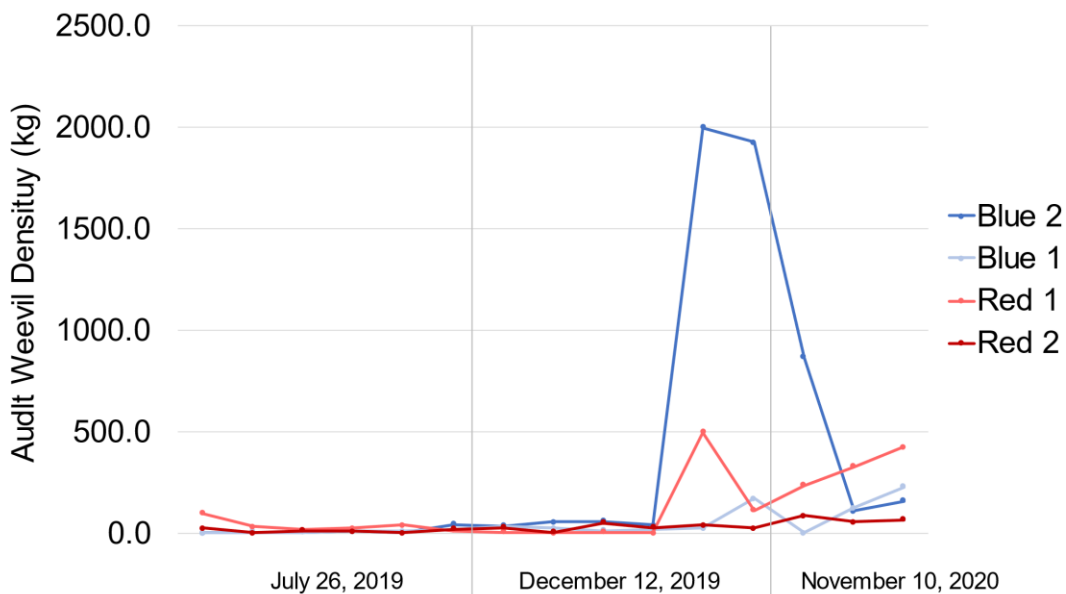


Figure 9. Line graph of adult weevil density (individuals per kilogram of salvinia) over time from July 2019 to November 2020 at Cane Bayou, Louisiana. Each line represents a different release site. Each point represents a different sampling point from the four sites in Cane Bayou, Louisiana.

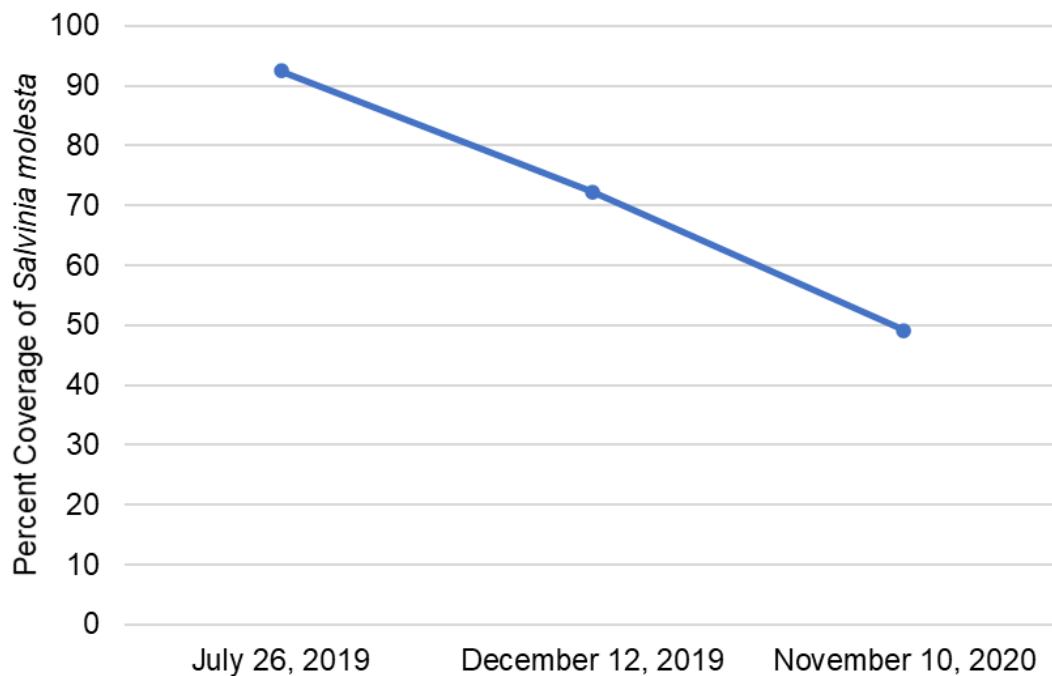


Figure 10. Decline in *Salvinia molesta* percent coverage from July 2019 to November 2020.

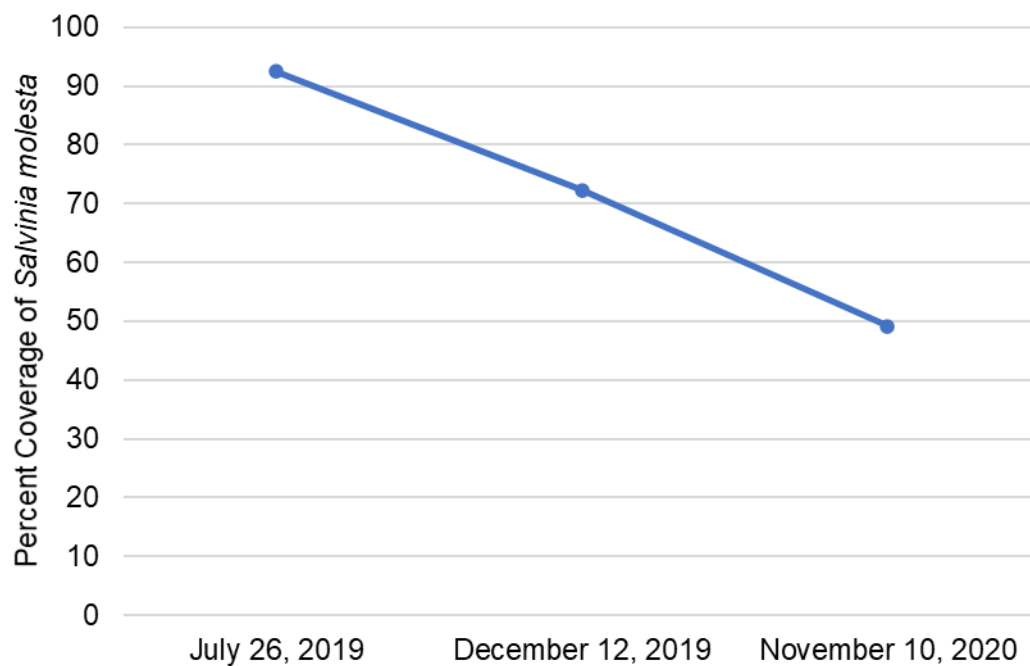


Figure 11. Decline in *Salvinia molesta* mat thickness (cm) from July 2019 to November 2020.



Figure 12. Images taken at Cane Bayou on November 10, 2020. A. Image representing the present coverage of *Salvinia molesta*. **B.** Dr. Rodrigo Diaz sampling the salvinia that was pushed against the vegetation (*Oxycaryum cubense*). **C.** Image representing salvinia damage which is recorded by the change in color or yellowing/browning.

Outreach and Educational Activities Related to Giant Salvinia

The LSU Weevil Instagram account has 59 followers. Future goals for the Instagram account are to have “Weevil Wednesdays” and “Science Fridays”. Specific content will be posted on those days in order to promote the program and educate the public. We created Facebook page for the program. So far, a combination of videos, posts, and pictures have reached over 600 people. The page currently has 37 followers.

We recommend to CWPPRA to share our Instagram account and Facebook account to any stakeholders or individuals interested in learning more about biocontrol, invasive species, wetland restoration, and/or giant salvinia and weevils. Here is the link to the Instagram page: https://www.instagram.com/weevil_rock_you/. Here is the link to the Facebook page: <https://www.facebook.com/weevilrockyou>.